

REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This amendment is in response to the Office Action dated August 11, 2003.

By the present amendment, Fig. 23 has been labeled as prior art. Accordingly, removal of the objection set forth in paragraph 1 of the Office Action is respectfully requested.

Also by the present amendment, claims 8-11 and 26 have been amended to place them in proper multiple dependent format (that is, not dependent on another multiply dependent claim). Accordingly, removal of the objection to claims 8-11 and 26 set forth in paragraph 2 of the Office Action, and treatment of these claims on the merits is respectfully requested.

Also by the present amendment, claims 1 and 9 have been amended to correct the minor informalities noted in paragraph 3 of the Office Action. Therefore, removal of these objections is also respectfully requested.

In addition, each of claims 1, 3, 11, 14, 24 and 26 has been amended to provide antecedent basis for the terms questioned in the 35 U.S.C. § 112, second paragraph, rejection set forth in paragraph 5 of the Office Action. Therefore, reconsideration and removal of this 35 U.S.C. § 112, second paragraph, rejection is respectfully requested.

Briefly, the present invention is directed to an improved image display apparatus which can operate with low power consumption. As discussed on page 2, line 25 through page 3, line 4 of the Substitute Specification filed on December 10, 2001, it has been difficult in the past to realize a high definition display with low

power consumption using conventional techniques such as shown, for example, in Fig. 23. Therefore, the present invention is particularly directed to providing such high definition low power consumption displays.

Referring to the first embodiment shown in Fig. 1, solely for purposes of example, one arrangement in accordance with the present invention is illustrated to achieve these desired results. In particular, a display 50, including a plurality of pixels 10, is provided with a low power consumption DA converter 6 located between the display 50 and a frame memory SRAM 7. On the other hand, a high precision DA converter 11 is provided between the display 50 and a line memory 12. In this particular embodiment, both the low power consumption DA converter 6 and the high precision DA converter 11 are coupled along the signal lines 5. A controller 14 is provided to control the various elements of the display unit.

In accordance with one feature of the present invention, the low power consumption DA converter 6 operates with a lower power consumption than the high precision DA converter 11. Whether the low power consumption DA converter 6 or the high precision DA converter 11 is operated is controlled by the output of the control unit 14. In addition, in accordance with one feature of the present invention, the display unit changes the number of independent pixel displays according to another instruction from the control unit.

In accordance with other features of the present invention, the different DA converters convert input signals into analog signals with different number of bits, respectively. Alternatively, in accordance with another feature of the present invention, the different DA converters convert the input signal into an analog signal with different frame frequencies, respectively. Incidentally, it is noted that the above

reference of Fig. 1 is solely for purposes of example, and not intended to limit the invention only to the specific details of this embodiment.

The following discussion addresses the various rejections set forth in the Office Action, beginning with the discussion of the independent claims 1, 12 and 22. Regarding this, it is noted that the claims have been reviewed and revised to correct minor informalities where noted. In addition, the word "composed" has been replaced with the word "comprised" since this is more customarily used in U.S. claim practice. In addition, terms such as "DA converter for converting" have been changed to "DA converter to convert" to avoid possible confusion regarding means plus function format.

Reconsideration and allowance of independent claim 1 over Nakajima (USP 6157358) is respectfully requested. Independent claim 1 sets forth the features that the operating power consumption of a first DA converter is smaller than that of a second DA converter. In the Office Action, it is stated on page 4, lines 1 and 2 that Nakajima meets this feature. However, it is respectfully submitted that a close examination of Nakajima indicates that this is not the case.

More specifically, although Nakajima teaches first and second converters 19 as part of first and second drivers 14 and 15 on different sides of the LCD effective screen portion 12, the difference between these driving circuits is the current handling method rather than the claimed feature of smaller power consumption. Specifically, one driving circuit for the DA converter is an inflow type whereas the driving circuit for the other DA converter is an outflow type. This is discussed, for example, in column 3, line 35-38 of Nakajima which states:

"In other words, the first column line driving circuit 14 operates as a sweep-off driving circuit while the second column line driving circuit 15 operates as a lead-in driving circuit."

As such, Nakajima is silent with regard to the claimed feature set forth in claim 1 that the "power consumption when said first DA converter is operated being smaller than that when said second DA converter is operated."

Claim 1 also includes the feature that:

("Said DA converter operates either of said DA converter and said second DA converter according to the instruction from said control unit, and outputs the converted analog signal to said display unit."

Page 4, line 3 et seq. of the Office Action states that Nakajima also meets this features. However, again, it is respectfully submitted that this is not the case.

More specifically, in Nakajima's arrangement, the first and second driving circuits are connected to respective signal lines in an alternate fashion. This is described, for example, in column 3, lines 14-20 which state:

"Concretely, when the output end of the output buffer 21 of the first column line driving circuit 14 is connected to the column line 13 at an odd step, timing is controlled so that the output end of the output buffer 21 of the second column line driving circuit 15 is connected to the column line 13 at an even step."

As such, the claim control of the operation of either the first or the second DA converter based on an instruction from the control unit is lacking in Nakajima.

Still further, claim 1 concludes with a feature:

("Wherein said display unit changes the number of the independent display pixels of said display unit according to the instruction from said control unit."

In the Office Action, it is stated on page 4, line 5 et seq. that this feature is also met. However, it is respectfully submitted that nothing in the cited portions of column 2, lines 34-67, column 3, line 1-67, and column 4, lines 15-17 teach or suggest this feature. Indeed, Applicants have been unable to locate any teaching or suggestion of this feature at all in Nakajima. If the Examiner disagrees, it is respectfully requested that the exact location of a teaching in Nakajima for this feature be set forth. Otherwise, reconsideration and allowance of independent claim 1 over Nakajima, based upon at least the three distinctive points noted above, particularly when considered in combination with the other recited features of claim 1, is earnestly solicited.

Reconsideration and allowance of independent claim 12 over Nakajima is also respectfully requested. Claim 12 also defines first and second DA converters, and particularly sets forth:

("Wherein said first DA converter and said second DA converter each convert the input signal into an analog image signal with different numbers of bits, respectively."

In the second paragraph of page 4 of the Office Action, it is stated that "Nakajima further teaches the first DA converter and the second DA converter each converts the input signal into an analog image signal with different number of bit, respectively (column 3, lines 3-67). However, it is respectfully submitted that a careful review of this portion of Nakajima leads to a different conclusion.

In particular, as noted above, the difference between the first and second driving circuits in Nakajima is the current handling technique. More particularly, as noted in column 3, lines 35-38, the first column line driving circuit 14 operates as a

sweep-off driving circuit while the second column line driving circuit 15 operates as a lead-in driving circuit. This does not provide any basis for teaching or suggesting any converting the input signal into an analog image signal with different numbers of bits in the respective first and second DA converters. Therefore, reconsideration and allowance of independent claim 12 is also respectfully requested.

Reconsideration and allowance of independent claim 22 is also respectfully requested. Claim 22, like independent claims 1 and 12, defines the first and second DA converters in the image display apparatus. In addition, claim 22 concludes with the limitation:

“Wherein said first DA converter and said second DA converter each convert input signal into an analog image signal with different frame frequencies, respectively.”

It is respectfully submitted that no teaching or suggestion for this exists in Nakajima. On the contrary, a review of Nakajima indicates that the first and second driving circuits operate with the same driving timing. Referring to column 4, lines 46-53, it is stated:

“Further, in the above described embodiment, the connection of the output end of the output buffer 21 of the first column line driving circuit 14 to the column line 13o or 13e and the connection of the output end of the output buffer 21 of the second column line driving circuit 15 to the column line 13e or 13o, have been switched for each horizontal period respectively, but the connection may be switched for each field.”

As such, there is absolutely no suggestion that the maximum driving frequency for the first and second driving circuits would be different from one another. Indeed, the specification is silent with regard to any such discussion of a frequency difference

between the first and second driving circuits. Therefore, reconsideration and allowance of independent claim 22 over Nakajima is also respectfully requested.

Finally, reconsideration and allowance of the dependent claims 2-11, 13-21 and 23-26 is also respectfully requested. With regard to this, various secondary references to Zavracky (USP 6552704) and Negishi (USP 5907314) have been cited concerning various secondary features set forth in the dependent claims. However, neither Zavracky nor Negishi teach or suggest anything to overcome the shortcomings of the primary reference to Nakajima with regard to the important limitation set forth in the respective independent claims 1, 12 and 22 noted above. Therefore, it is urged that the overall combination set forth by these dependent claims, when considered in conjunction with features of their respective parent claims, clearly define over the cited prior art, and reconsideration and allowance of these dependent claims is also respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus,

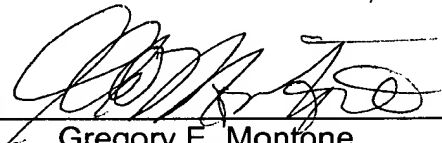
Application No.: 09/888,644

503.40291X00

LLP Deposit Account No. 01-2135 (Docket No. 503.40219X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By 
Gregory E. Montone
Reg. No. 28,141

GEM/dlt

1300 North Seventeenth Street, Suite 1800
Arlington, Virginia 22209
Telephone: (703) 312-6600
Facsimile: (703) 312-6666